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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,277	03/23/2004	John R. Webster	84736	1839

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EXAMINER	
EASTMAN, AARON ROBERT	
ART UNIT	PAPER NUMBER
4147	
MAIL DATE	DELIVERY MODE
02/14/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/806,277	WEBSTER ET AL.	
	Examiner	Art Unit	
	AARON R. EASTMAN	4147	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) *4,5 and 18-22* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,6-16,23 and 24* is/are rejected.

7)☒ Claim(s) *17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07/02/2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :03/23/2004, 03/23/2005 & 10/27/2005.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "61" has been used to designate both processor unit and electric cable, reference character "38" has been used to designate both radially inner limb and corrugations, reference character "36" has been used to designate radially inner portion, axially extending portion and inner portion. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The specification is objected to for failing to specify the reference(s) from which it claims priority in the first sentence after the title as pointed out in 37 CFR (a)(2)(iii).

3. The disclosure is objected to because of the following informalities: Page 9 lines 3 - 5 reads "…The radially inner ends 43B of the walls 42B axially downstream of the annular members 30 are secured to the radially inner ends 43A of…". Items 43A and 43B are not shown in the drawings. Page 9 lines 28 - 30 reads "The embodiment of

compressor rotor blade tip seal 48B in figure 4 is substantially the same as that in figures 2 and 3 but…". Item 48B is not shown in figures 2 and 3. Page 10 line 22 reads "…and the processor unit 61 without the electric cable 61…". Item 61 is not an electric cable. Page 10 line 33 reads "…radial movement of the member 53 adjusts the radial…". Item 53 is an electrical cable and does not move radially. Page 11 lines 10 - 12 reads "…figure 6 comprises a plurality of shape memory alloy wires 66 and each shape memory alloy wire 66 extends over a circumferential portion of the radially inner limb 38 of…". Item 38 is listed as corrugations on page 8 line 4. In addition, item 38 is not shown in Figure 6. Page 11 line 26 reads "…radially inner portion 36…". Item 36 is listed as axially extending portion on page 7 line 17. In addition, item 36 is not shown in Figure 6. Page 12 line 10 reads "… radially inner portion 36…". Item 36 is listed as axially extending portion on page 7 line 17. Page 12 lines 33 – 34 read "…and the inner portion 36…". Item 36 is listed as axially extending portion on page 7 line 17. Appropriate correction is required.

Claim Objections

4. Claim 17 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n). Accordingly, the claim 17 is interpreted as being dependent upon claim 14 only.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1 - 3, 6, 7, 10, 14 – 16, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent Number 5,545,007 (Martin hereinafter) in view of 5,366,255 (Garkawe hereinafter).

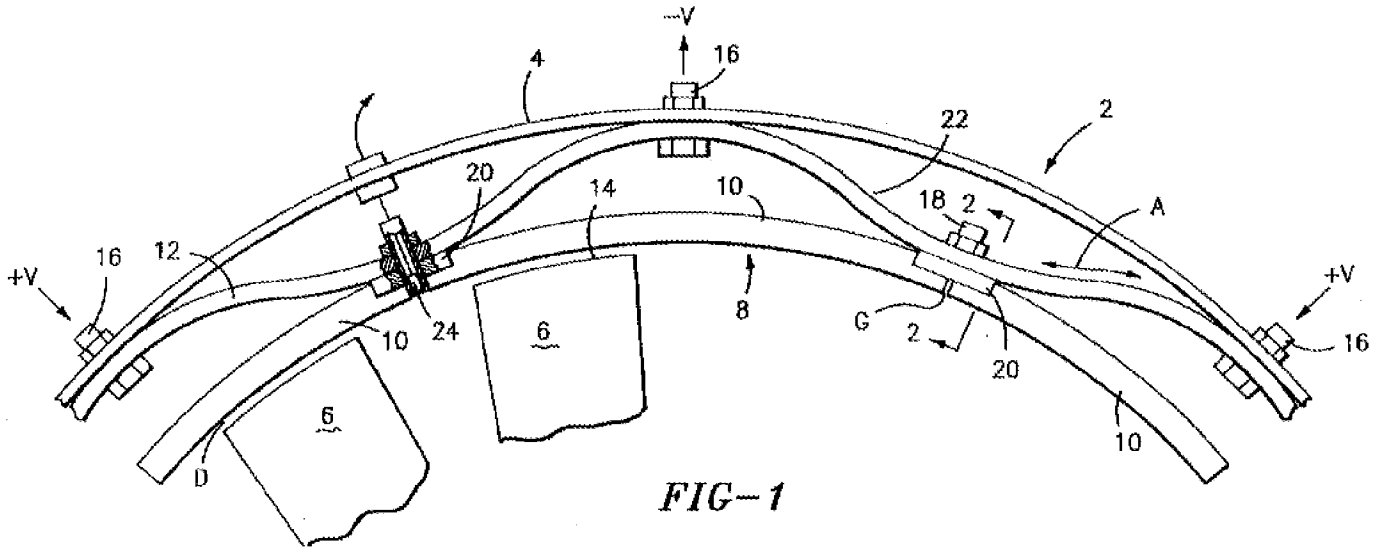


Figure 1 of US Patent Number 5,545,007 (Martin hereinafter)

7. In re claim 1 & 2, Martin discloses a seal between a first member (6) and a second member (4), the first and second members being relatively moveable, the second member being spaced from the first member, a third member (12) being positioned between the second member and the first member, the third member being secured to the second member or the first member, the third member having at least one corrugation in a direction between the first member and the second, a lining (10) being secured to the third member, the lining being spaced from the first member (6) or the second member (4) to form a seal. Martin fails to disclose at least one corrugation

in a direction transverse to the direction between the first member and the second member.

8. Garkawe teaches adding corrugations to a member disposed in an elevated temperature environment to allow for expansion (col. 4 lines 56 & 57), to absorb a temperature difference (col. 4 lines 62 - 65) and to permit relative movement between the member and adjacent parts (col. 7 claim 11).

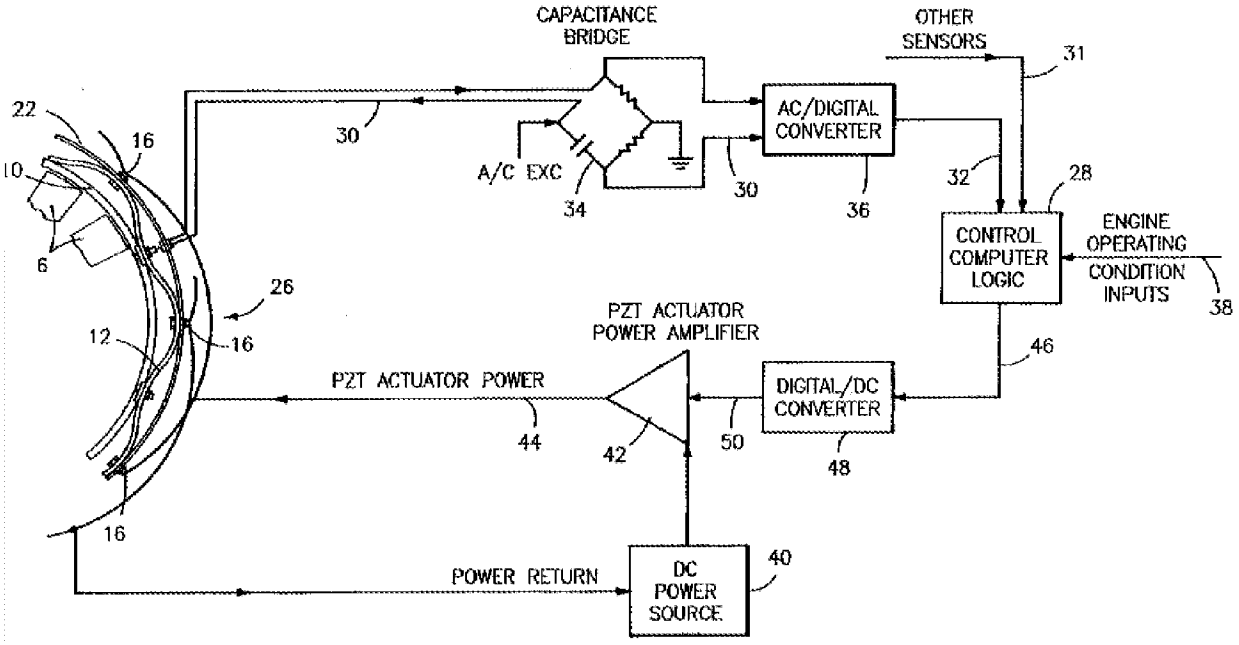
9. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the plurality of corrugations as taught in Garkawe with the seal disclosed by Martin for the purposes of allowing for expansion, absorbing a temperature difference and to allow for relative movement between the seal and adjacently disposed parts.

10. In re claim 3, Martin discloses wherein the first member is a rotor and the second member is a stator.

11. In re claim 6, Martin discloses wherein the first member is a rotor carrying a plurality of circumferentially spaced radially extending rotor blades (6), the second member is a casing (4) surrounding the rotor and rotor blades, the third member (12) is an annular member being secured to and arranged within the casing, the annular member having a plurality of radially spaced circumferentially extending corrugations, the lining (10) being arranged radially between the tips of the rotor blades (14) and the annular member (12), the lining being secured to the annular member (12), the lining (10) being spaced radially from the tips of the rotor blades to form a seal.

12. In re claim 7, Martin discloses wherein the third member is S-shaped in cross-section

13. In re claim 10, Martin discloses wherein the third member is a thin structure.



FIG–3

Figure 3 of Martin

14. In re claim 14, Martin discloses means to measure (24) a clearance (D) between the lining (10) and the first member or the second member to produce a clearance signal indicative of the size of the clearance, processor means to determine if the clearance signal is within a predetermined range of clearances and means to adjust the clearance between the lining and the first member or second member if the processor means determines that the clearance signal is outside the predetermined range of clearances (see Figures 3 and 4 and col. 4 line 51 through col.5 line 51 of Martin).

15. In re claim 15, Martin discloses a means to measure the clearance comprising at least one capacitance sensor (see Figures 3 and 4 of Martin).

16. In re claim 16, Martin discloses wherein the means to measure (24) the clearance (D) is arranged within the lining (10).

17. In re claim 23, Martin discloses wherein the rotor is a fan rotor, a compressor rotor or a turbine rotor (see Abstract of Martin).

18. In re claim 24, Martin discloses wherein the rotor is a gas turbine engine rotor (see Abstract of Martin).

19. Claims 8, 9, 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin and Garkawe in further view of US Patent Number 6,547,522 (Turnquist et al. hereinafter).

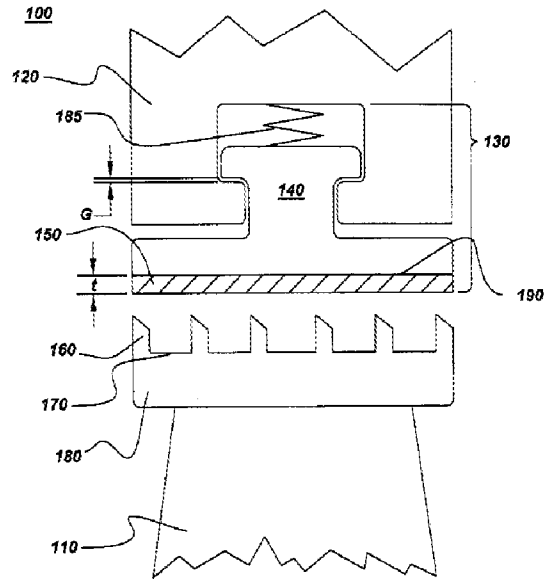


fig. 1

Figure 1 of US Patent Number 6,547,522 (Turnquist et al. hereinafter)

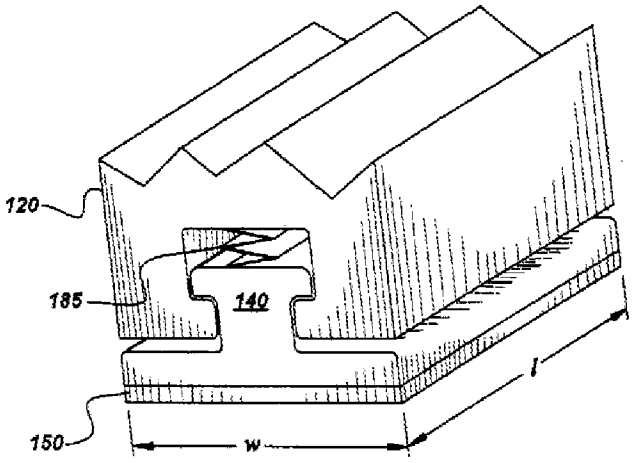


fig. 5

Figure 5 of Turnquist et al.

20. In re claim 8, 9 and 11 Martin and Garkawe disclose all of the limitations except for wherein the third member is Z-shaped in radial cross-section, the third member is resilient and the third member comprises a metal sheet.

21. Turnquist et al. teaches a seal between a rotor blade tip (160, first member) and a turbine casing (120, second member) comprising a spring (185, third member) disposed between the housing and the seal carrier segments, wherein the third member (185, Fig. 1) is Z-shaped in radial cross-section, the third member is a spring (col. 2 line 53) which is inherently resilient and the third member comprises a metal sheet (185, Fig. 2).

22. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the third member of the modified seal of Martin such that the third member is a spring having Z-shaped radial cross-section made from a sheet of

metal as taught in Turnquist et al. for the purposes of ease of construction of the member and to increase the life of the member.

23. In re claim 13, Martin and Garkawe disclose all of the limitations except for wherein the lining comprises felt metal, metal foam, or a porous sintered metal.

24. Turnquist et al. teaches a turbine seal lining comprising felt metal, metal foam, or a porous sintered metal (col. 3 lines 57 – 60).

25. It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the lining comprising felt metal, metal foam, or a porous sintered metal as taught in Turnquist et al. into the seal assembly disclosed by Martin and Garkawe for the purposes of making the lining abradable

26. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Martin and Garkawe in further view of US Patent Application Number 2001/0006278 (Haje hereinafter).

27. In re claim 12, Martin and Garkawe disclose all of the limitations except for wherein the third member comprises steel, titanium, a titanium alloy or a nickel alloy.

28. Haje teaches a seal (2) between a rotor blade tip or first member (28, Fig. 2) and a turbine housing or second member (23), wherein the seal or the third member comprises steel, titanium, a titanium alloy or a nickel alloy (page 3, para. 20, lines 7-9 of para. 20).

29. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the third member from steel, titanium, a titanium alloy or a

nickel alloy as taught in for the purposes of providing a seal with high temperature resistance.

Allowable Subject Matter

30. Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and to overcome the objections set forth in the **Claim Objections** section of this office action (para. 4 above).

Conclusion

31. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent Number 5145316 discloses using bellows to move a seal. US Patent Numbers 5818242 and 6375411 both disclose a radial gap sensor disposed within the lining.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AARON R. EASTMAN whose telephone number is (571)270-3132. The examiner can normally be reached on Mon-Fri 9:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, George Nguyen can be reached on 571-272-4491. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Aaron R. Eastman
Examiner
Art Unit 4147

/Ninh H. Nguyen/
Primary Examiner, Art Unit 3745